

**AMENDMENTS TO THE CLAIMS**

1. (withdrawn) A method for cleaving IAP, wherein the method comprises:  
contacting *in vitro*, isolated IAP with an amount of an isolated Omi family polypeptide,  
whereby upon contact, the Omi family polypeptide will cleave the IAP.
2. (withdrawn) The method of Claim 1, wherein the IAP is selected from the group consisting  
of cIAP1, cIAP2, XIAP, Livin  $\alpha$ , Livin  $\beta$ , and DIAP1.
3. (withdrawn) The method of Claim 1, wherein the Omi family polypeptide is selected from  
the group consisting of SEQ ID NOs. 44, 45, 48, 49, 54-57, 60-63, 66-75, and homologs  
thereof.
4. (withdrawn) The method of Claim 1, wherein the Omi family polypeptide to IAP molar  
ratio *in vitro* is equal to between 1:5 to 1:30 molar ratio of Omi to IAP.
5. (withdrawn) The method of Claim 1, wherein the Omi family polypeptide is expressed by a  
nucleic acid sequence molecule selected from the group consisting of SEQ ID NOs. 1-3, 6-  
8, 11-19, 22-27, and 30-39, and homologs thereof.
6. (withdrawn) The method of Claim 1, wherein the *in vitro* conditions incubation time is 2  
hours at 37° C in solution.
7. (withdrawn) A method for cleaving IAP, wherein the method comprises:  
(a) isolating a population of cells, whereby the caspase found in the cells is bound by  
IAP;  
(b) contacting *in vitro* the isolated cell population with the Omi family polypeptide  
whereby upon contact, the Omi family polypeptide cleaves the IAP from the caspase.

8. (withdrawn) The method of Claim 7, wherein the Omi family polypeptide is selected from the group consisting of SEQ ID NOs. 44, 45, 48, 49, 54-57, 60-63, 66-75.
9. (withdrawn) The method of Claim 7, wherein the Omi family polypeptide is selected from the group consisting of Omi WT, Omi $\Delta$ PDZ, Omi $\Delta$ AVPS, Omi protease and Omi catalytic triad.
10. (withdrawn) The method of Claim 8, wherein the Omi family polypeptide is in a carrier.
11. (withdrawn) The method of Claim 10, wherein the carrier is a liposome.
12. (withdrawn) A method for cleaving IAP comprising:
  - (a) isolating and amplifying an Omi family member gene;
  - (b) forming an Omi expression construct from the isolated and amplified Omi family member gene;
  - (c) transfecting a cell population having caspase bound by IAP, with the Omi family member construct; and,
  - (d) causing expression of the Omi vector, whereby the OMI family polypeptide cleaves IAP.
13. (withdrawn) The method of Claim 12, wherein the Omi family polypeptide is expressed by a nucleic acid sequence molecule selected from the group consisting of SEQ ID NOs. 1-3, 6-8, 11-19, 22-27, and 30-39, and homologs thereof.
14. (withdrawn) The method of Claim 12, wherein expression is caused by the addition of etoposide.
15. (withdrawn) The method of Claim 12, wherein expression is caused by damage to the cell.

16. (withdrawn) A method for cleaving IAP, wherein the method comprises:  
contacting isolated IAP with an amount of an isolated Omi family polypeptide, whereby  
upon contact, the Omi family polypeptide will cleave the IAP.
17. (currently amended) A polypeptide for cleaving IAP selected from the group consisting of  
variant Omi WT (SEQ ID NO. 45), OmiDPDZ, OmiAPDZ, wherein OmiAPDZ is selected  
from the group consisting of SEQ ID NOs. 48, 49, 56, 57, 60-63, and 66-75, OmiAAVPS,  
wherein OmiAAVPS is selected from the group consisting of SEQ ID NOs. 52, 53, and 77,  
Omi serine protease, wherein Omi serine protease is selected from the group consisting of  
SEQ ID NOs. 54 and 55, and Omi catalytic triad, wherein Omi catalytic triad is selected  
from the group consisting of SEQ ID NOs. 60 and 61, and homologs thereof.
18. (currently amended) The polypeptide of Claim 17, further comprising a pharmacologically  
acceptable carrier.
19. (currently amended) The polypeptide of Claim 17, wherein the polypeptide is selected from  
the group consisting of expressed intra-cellular, isolated, [or] and recombinant  
polypeptides.
20. Canceled.
21. Canceled.
22. (currently amended) ~~A polypeptide having~~ The polypeptide of Claim 17, wherein the  
polypeptide has increased protease activity and is comprising a polypeptide selected from  
the group consisting essentially of SEQ ID NOs. 48, 49, 54, 55, 56, 57, 60-63, and 66-75,  
and homologs thereof.

23. (currently amended) A polypeptide for binding to a BIR site on an IAP, comprising SEQ ID NO. ~~77~~and homologs thereof.
24. Canceled.
25. Canceled.
26. (currently amended) A polypeptide ~~which~~ that binds to IAP, but does not cleave IAP, selected from the group consisting of SEQ ID NOs. 46, 47, 50, 51, 58, 59, 64, 65, and 77, ~~homologs thereof~~.
27. Canceled.
28. Canceled.
29. Canceled.
30. (currently amended) A polypeptide molecule for cleaving an IAP comprising an amino acid sequence as set forth in C1<sub>n1</sub>-R1-C2<sub>n2</sub>-R2-C3<sub>n3</sub>-R3-C4<sub>n4</sub>, wherein:
- (a) R1 is a serine;
  - (b) R2 is an amino acid residue selected from a group consisting of charged amino acid residues and aromatic amino acid residues;
  - (c) R3 is an amino acid residue selected from a group consisting of charged amino acid residues and polar amino acid residues; [and<sub>7</sub>]
  - (d) R1, R2 and R3 form a catalytic triad for cleavage of the IAP<sub>3</sub>
  - (e) C1<sub>n1</sub>, C2<sub>n2</sub>, C3<sub>n3</sub>, and C4<sub>n4</sub> are polypeptide chains;
  - (f) n1 is an amino acid residue number ranging between 10 and 100;
  - (g) n2 is an amino acid residue number ranging between 10 and 100;
  - (h) n3 is an amino acid residue number ranging between 10 and 150; and

(i) n4 is an amino acid residue number ranging between 10 and 200.

31. (original) The molecule of Claim 30, wherein R2 is an amino acid residue selected from a group consisting of histidine, lysine, arginine, phenylalanine, tyrosine, and tryptophan.

32. (original) The molecule of Claim 30, wherein R3 is an amino acid residue selected from a group consisting of aspartic acid, glutamic acid, lysine, histidine, and arginine.

33. Canceled.

34. Canceled.

35. Canceled.

36. Canceled.

37. Canceled.

38. (currently amended) The molecule of Claim [33] 30, wherein the C1<sub>n1</sub> polypeptide chain is the N-terminal and has an AVPS motif sequence that operably couples to IAP, wherein the AVPS motif sequence comprises SEQ ID NO. 77.

39. (currently amended) The molecule of Claim [33] 30, wherein the C4<sub>n4</sub> chain is the C-terminal and has a hinge sequence and PDZ domain, wherein the hinge sequence comprises residues located at positions 213-225 of SEQ ID NO. 44, and the PDZ domain comprises SEQ ID NO. 76.

40. (original) The molecule of Claim 39, wherein the PDZ domain is removed.

41. (currently amended) The molecule of Claim 30 wherein a C1<sub>n1</sub> polypeptide chain has an N-terminal location and ~~comprises~~ is an amino acid sequence selected from a group consisting essentially of as set forth in SEQ ID NOs. 54 and 55.

42. (original) The polypeptide of Claim 30 operably enclosed in a liposome in an aqueous medium.

43. Canceled.

44. Canceled.

45. Canceled.

46. Canceled.

47. Canceled.

48. Canceled.

49. (currently amended) A polypeptide molecule for inhibiting IAP cleavage comprising an amino acid sequence as set forth in C1<sub>n1</sub>-R1-C2<sub>n2</sub>-R2-C3<sub>n3</sub>-R3-C4<sub>n4</sub>, wherein:

(a) R1 is an amino acid residue selected from a group consisting of an alanine, an arginine, an aspartic acid, an asparagine, a cysteine, a glutamic acid, a glutamine, a glycine, a histidine, an isoleucine, a leucine, a lysine, a methionine, a phenylalanine, a proline, a threonine, a tryptophan, a tyrosine, and a valine;

(b) R2 is a histidine;

(c) R3 is an aspartic acid; [~~and~~]

(d) C1<sub>n1</sub>, C2<sub>n2</sub>, C3<sub>n3</sub>, and C4<sub>n4</sub> are polypeptide chains;

(e) n1 is an amino acid residue number ranging between 10 and 100;

(f) n2 is an amino acid residue number ranging between 10 and 100;

(g) n3 is an amino acid residue number ranging between 10 and 150;

(h) n4 is an amino acid residue number ranging between 10 and 200; and

(i) the C1<sub>n1</sub> polypeptide chain has an AVPS moiety that binds to IAP.

50. (currently amended) The polypeptide of Claim 19, wherein the polypeptide is an [Aa]  
Omi $\Delta$ PDZ expressed intra-cellularly by an Omi $\Delta$ PDZ vector in a cell.
51. (withdrawn) A nucleic acid sequence, which expresses a polypeptide which cleaves IAP,  
wherein the nucleic acid sequence is selected from the group consisting of Omi family  
member nucleic acid sequences, degenerate variants of the Omi family member, and  
homologous sequences to the Omi family member.
52. (withdrawn) The nucleic acid sequence of Claim 51, wherein the sequence is selected from  
the group consisting of SEQ ID NOs. 1-41, and homologous sequences thereof.
53. (withdrawn) The nucleic acid sequence of Claim 51, wherein the sequence is selected from  
the group consisting of Omi WT, OmiDPDZ, Omi $\Delta$ AVPS, Omi protease, Omi catalytic  
triad, and homologs thereof.
54. (withdrawn) A nucleic acid sequence which expresses isolated polypeptide for cleaving  
IAP, wherein the nucleic acid sequence is selected from the group consisting of SEQ ID  
NOs. 1-43, and homologous sequences thereof.
55. (withdrawn) A nucleic acid sequence which expresses a polypeptide for cleaving IAP,  
wherein the nucleic acid sequence expresses a protease domain, selected from the group  
consisting of SEQ ID NOs. 44, 45, 48 and 49, and homologous sequences thereof.
56. (withdrawn) A nucleic acid sequence which expresses a polypeptide having increased  
protease activity comprising a polypeptide selected from the group consisting of SEQ ID  
NOs. 48, 49, 50, 56, 57, 58, 59, 60, 61, and homologous sequences thereof.
57. (withdrawn) A nucleic acid sequence which expresses a polypeptide for binding to a BIR  
site on an IAP, comprising SEQ ID NO. 82 and homologous sequences thereof.

58. (withdrawn) A nucleic acid sequence which expresses a polypeptide for cleaving IAP comprising a polypeptide selected from the group consisting of SEQ ID NOs. 44, 45, and homologous sequences thereof.
59. (withdrawn) A nucleic acid sequence, which expresses a polypeptide, which binds to IAP, but does not cleave IAP, selected from the group consisting of SEQ ID NOs. 4, 5, 9, 10, 20, 21, 28, and 29, and homologs thereof.
60. (withdrawn) A nucleic acid sequence which expresses a polypeptide which binds IAP but does not cleave IAP, comprising Omi SA.
61. (withdrawn) An expression vector comprising a nucleic acid that expresses a molecule for cleaving IAP selected from a group consisting of SEQ ID NOs. 1-43, and homologous sequences thereof.
62. (withdrawn) The expression vector of Claim 61, wherein the expression vector is selected from a group consisting of a plasmid and an episome.
63. (withdrawn) The expression vector of Claim 61, wherein the expression vector comprises a replicating virus.
64. (withdrawn) The expression vector of Claim 61, wherein the expression vector is a pE721b vector.
65. (withdrawn) An Omi expression vector, comprising an Omi family nucleic acid sequence and a vector selected from the group consisting of eukaryotic vectors MSCV, Harvey murine sarcoma virus, pFastBac, pFastBac HT, pFastBac DUAL, pSFV, pTet-Splice, pEUK-C1, pPUR, pMAM, pMAMneo, pBI101, pBI121, pDR2, pCMVEBNA, YACneo,



pSVK3, pSVL, pMSG, pCH110, pKK232-8, p3'SS, pBlueBacIII, pCDM8, pcDNA1, pZeoSV, pcDNA3, pREP4, pET21b, pCEP4, and pEBVHis vectors.

66. (withdrawn) A transfected cell comprising:

- (a) an expression vector that expresses an Omi family member polypeptide; and,
- (b) a promoter.

67. (withdrawn) The transfected cell of Claim 66, wherein the transfected cell is selected from the group consisting of an animal cell and a plant cell.

68. (withdrawn) The transfected cell of Claim 66, wherein the transfected cell is a tumor cell.

69. (withdrawn) The transfected cell of Claim 66, wherein the polypeptide is an Omi $\Delta$ PDZ.

70. (withdrawn) The transfected cell of Claim 66, wherein the vector is selected from the group consisting of eukaryotic vectors MSCV, Harvey murine sarcoma virus, pFastBac, pFastBac HT, pFastBac DUAL, pSFV, pTet-Splice, pEUK-C1, pPUR, pMAM, pMAMneo, pBI101, pBI121, pDR2, pCMVEBNA, YACneo, pSVK3, pSVL, pMSG, pCH110, pKK232-8, p3'SS, pBlueBacIII, pCDM8, pcDNA1, pZeoSV, pcDNA3, pREP4, pET21b, pCEP4, and pEBVHis vectors.

71. Canceled.

72. (withdrawn) A method of treating the hyperproliferative disorder comprising administering an effective amount of the pharmacological composition of Claim 71 into an animal.

73. (withdrawn) A hybridization kit for detecting an Omi wild-type gene, wherein the kit comprises:

- (a) a container; and,

(b) a nucleic acid molecule comprising a nucleotide molecule selected from a group consisting of Omi family nucleic acid sequences.

74. (withdrawn) A hybridization kit for detecting an Omi mutant gene, wherein the kit comprises:

(a) a container; and,

(b) a nucleic acid molecule comprising a molecule selected from a group consisting of SEQ ID NOs. 1-41, and homologous sequences thereof.

75. (withdrawn) A kit for detecting an Omi gene comprising:

(a) PCR primers spanning an Omi family gene, a positive control; and,

(b) sequencing products.

76. (withdrawn) A kit for detecting an Omi polypeptide, wherein the kit comprises:

(a) a container; and,

(b) an antibody derived from polypeptide selected from a group consisting of SEQ ID NOs. 44-77, and homologs thereof.

77. (withdrawn) An antibody which binds to the Omi serine.

78. (withdrawn) An antibody which binds to a protease.

79. (withdrawn) A mammalian cell consisting essentially of:

(a) a cell transfected by an Omi expression vector;

(b) the transfected cell producing an IAP-cleaving molecule selected from the group consisting of said IAP-cleaving molecules; and,

(c) a promoter controlling transcription and the quantity of production of said IAP-cleaving molecule.

80. (withdrawn) The mammalian cell of Claim 79, wherein, in the transfected cell, the expression vector is autonomously replicating.
81. (withdrawn) The mammalian cell of Claim 79, wherein said transfected cell is a human cell.
82. (withdrawn) A method of detecting and identifying an IAP-cleaving molecule comprising:
- (a) binding an antibody directed against an antigen associated with the IAP-cleavage site on said IAP-cleaving molecule to a solid phase adsorbent surface;
  - (b) adding a specimen containing a plurality of unlabelled IAP-cleaving molecules;
  - (c) adding a plurality of labeled IAP-cleaving molecules;
  - (d) detecting the bound labeled IAP-cleaving molecules; and,
  - (e) calculating the amount of bound unlabeled IAP-cleaving molecules.
83. (withdrawn) The method of Claim 82, wherein the antibody is selected from the group consisting of a monoclonal antibody, a polyclonal antibody, and a recombinant antibody.
84. (withdrawn) The method of Claim 82, wherein the label is selected from the group consisting of a radiolabel, a luminescent label, and a colorimetric label.
85. (withdrawn) The method of Claim 82, wherein the antibody is selected of the group consisting of SEQ ID NOs. 44-77, and homologs thereof.
86. (withdrawn) An Omi expression vector, comprising an Omi family nucleic acid sequence selected from the group consisting of SEQ ID NOs. 1-41, and homologs thereof, and a vector selected from the group consisting of eukaryotic vectors MSCV, Harvey murine sarcoma virus, pFastBac, pFastBac HT, pFastBac DUAL, pSFV, pTet-Splice, pEUK-C1, pPUR, pMAM, pMAMneo, pBI101, pBI121, pDR2, pCMVEBNA, YACneo, pSVK3,

pSVL, pMSG, pCH110, pKK232-8, p3'SS, pBlueBacIII, pCDM8, pcDNA1, pZeoSV, pcDNA3, pREP4, pET21b, pCEP4, and pEBVHis vectors.

87. (new) The polypeptide of Claim 17 operably enclosed in a liposome in an aqueous medium.
88. (new) The polypeptide of Claim 26 operably enclosed in a liposome in an aqueous medium.
89. (new) The polypeptide of Claim 26, further comprising a pharmaceutically acceptable carrier.
90. (new) The polypeptide of Claim 26, wherein the polypeptide is selected from the group consisting essentially of expressed intra-cellular, isolated, and recombinant polypeptides.
91. (new) The molecule of Claim 30, operably enclosed in a liposome in an aqueous medium.
92. (new) The molecule of Claim 30, further comprising a pharmaceutically acceptable carrier.
93. (new) The molecule of Claim 30, wherein the molecule is selected from the group consisting essentially of expressed intra-cellular, isolated, and recombinant polypeptides.
94. (new) The molecule of Claim 49, operably enclosed in a liposome in an aqueous medium.
95. (new) The molecule of Claim 49, further comprising a pharmaceutically acceptable carrier.
96. (new) The molecule of Claim 49, wherein the molecule is selected from the group consisting essentially of expressed intra-cellular, isolated, and recombinant polypeptides.